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**Green et al.**

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(54) **EFFICIENTLY AND EASILY OPENING AND CLOSING A CANISTER VALVE**

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**B67D 1/00** (2006.01)  
**B67D 1/12** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **B67D 1/0406** (2013.01); **B67D 1/008** (2013.01); **B67D 1/125** (2013.01); **B67D 1/0021** (2013.01); **B67D 1/12** (2013.01); **Y10T 137/0318** (2015.04); **Y10T 137/0402** (2015.04); **Y10T 137/6966** (2015.04); **Y10T 137/8593** (2015.04)

(58) **Field of Classification Search**

CPC ..... B67D 1/0406; B67D 1/008; B67D 1/125; B67D 1/12; B67D 1/0021; Y10T 137/8593; Y10T 137/6966  
USPC ..... 222/129.1, 182, 402.1, 402.14, 402.15  
See application file for complete search history.

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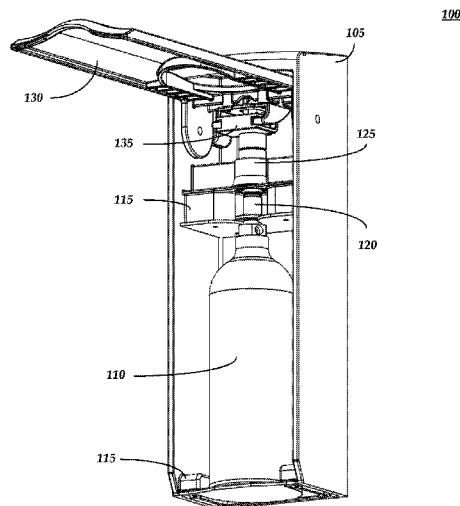
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(57) **ABSTRACT**

The present disclosure relates to a canister connection apparatus designed to efficiently and easily connect a pressurized canister to an external system.

**11 Claims, 9 Drawing Sheets**



100

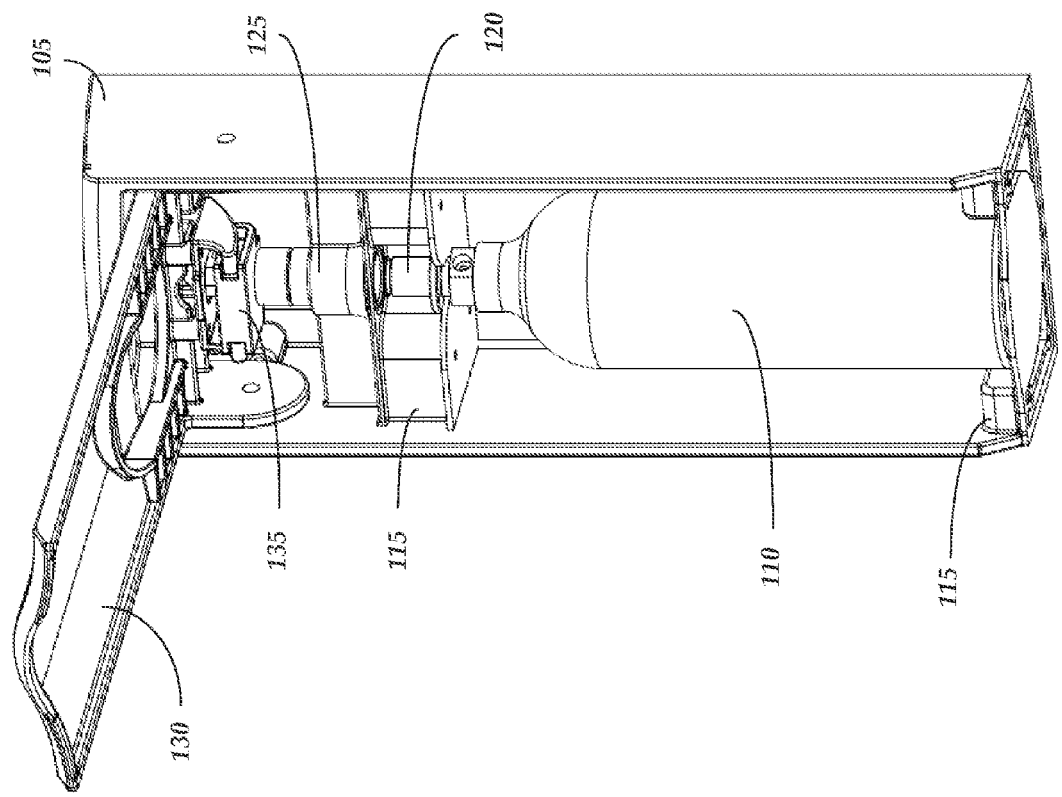
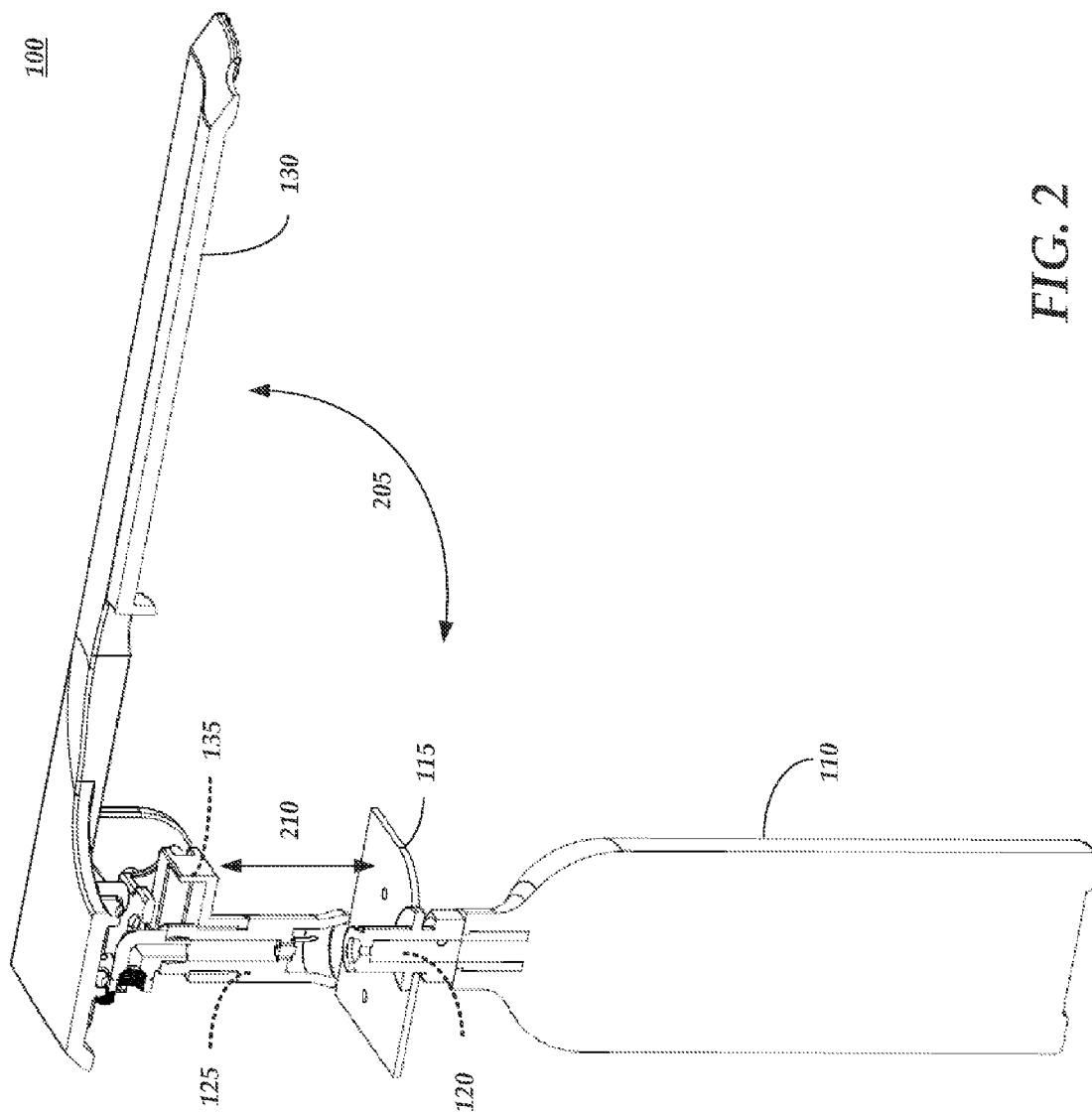


FIG. 1



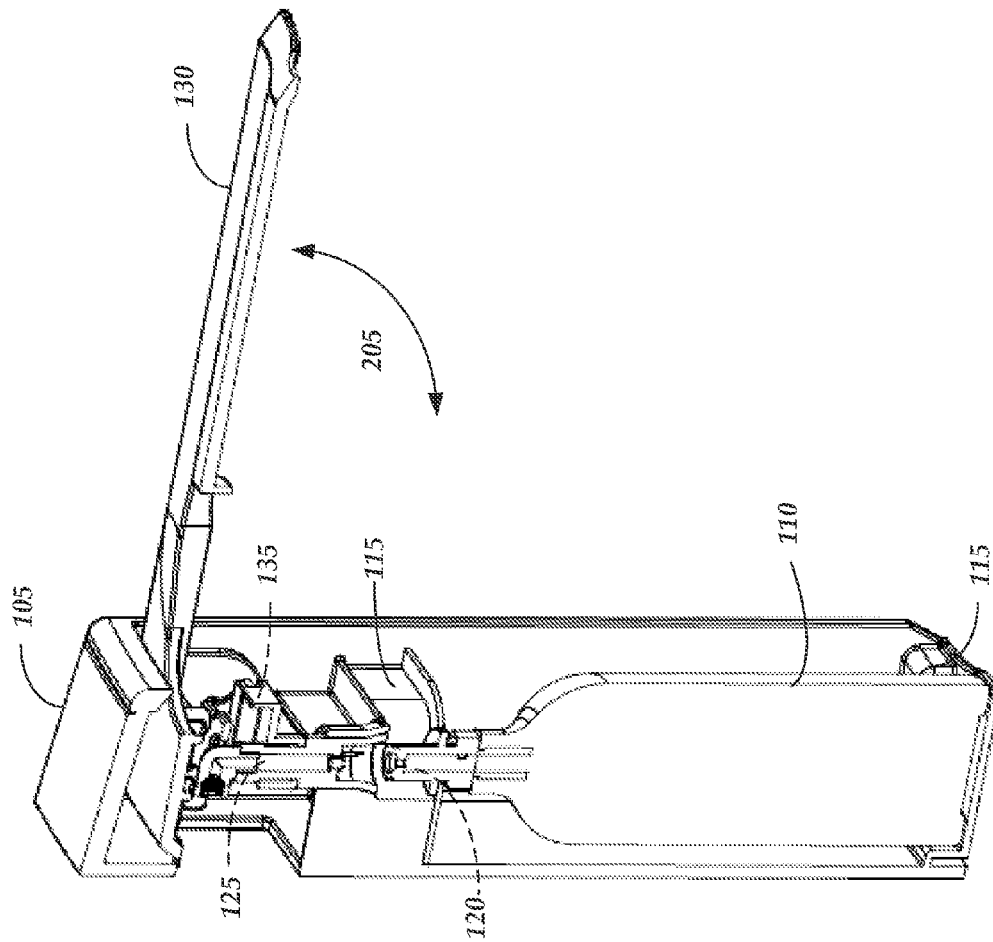
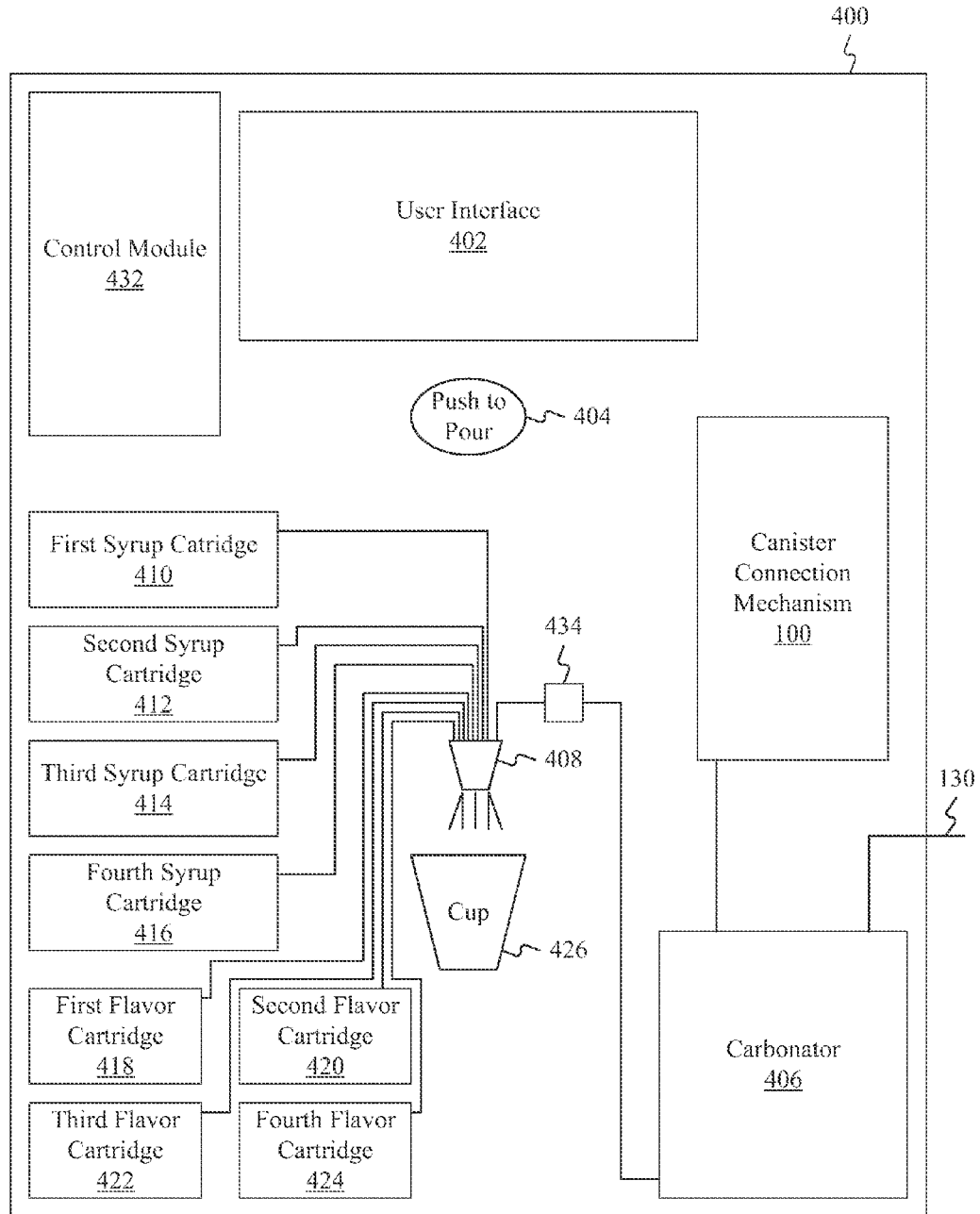


FIG. 3

**FIG. 4**

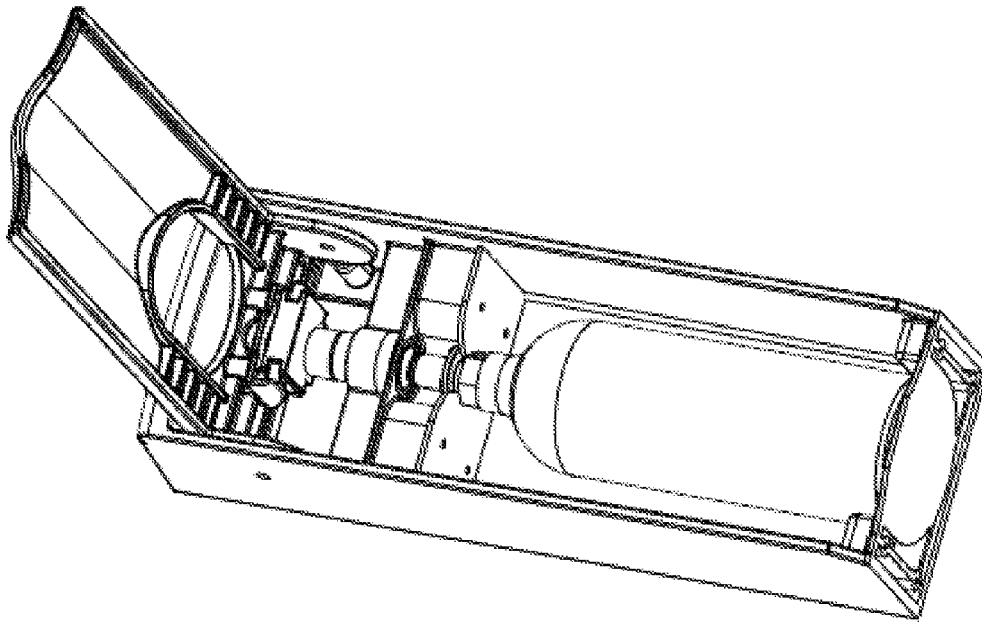


FIG. 5b

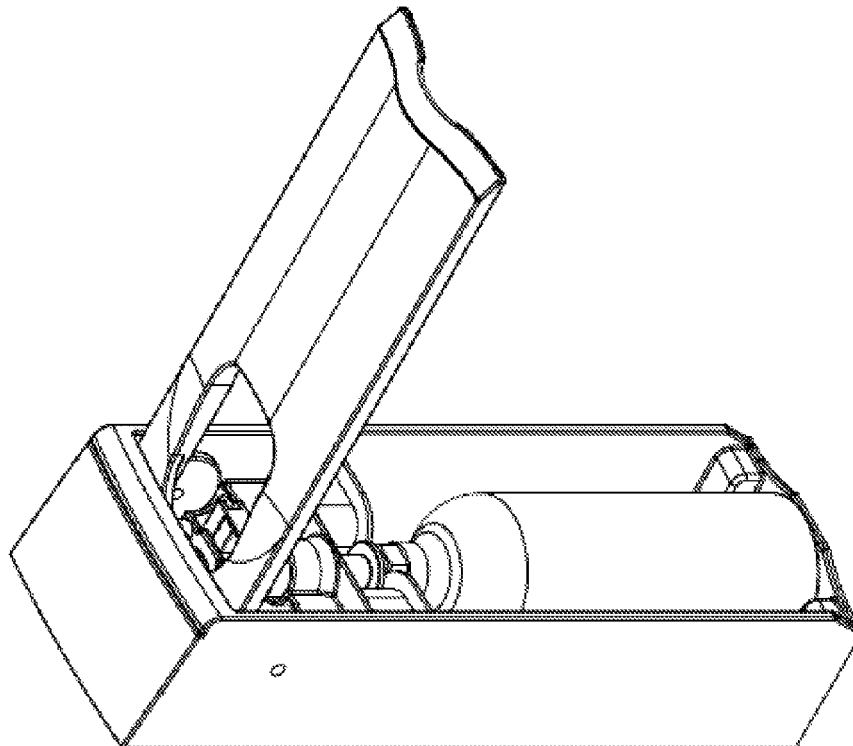


FIG. 5a

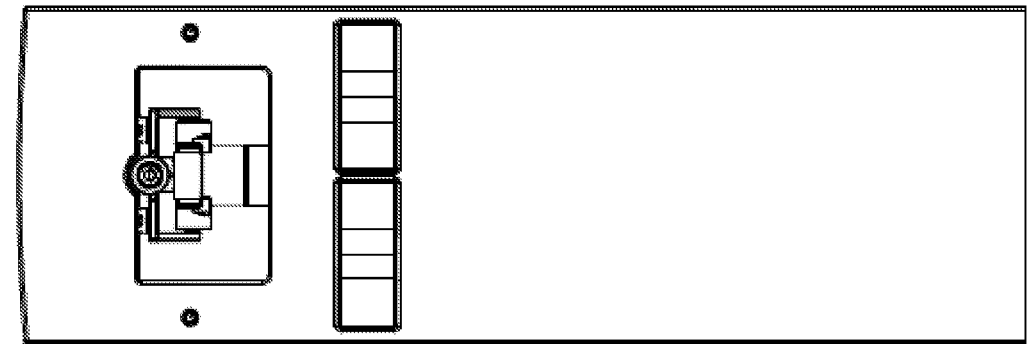


FIG. 6a

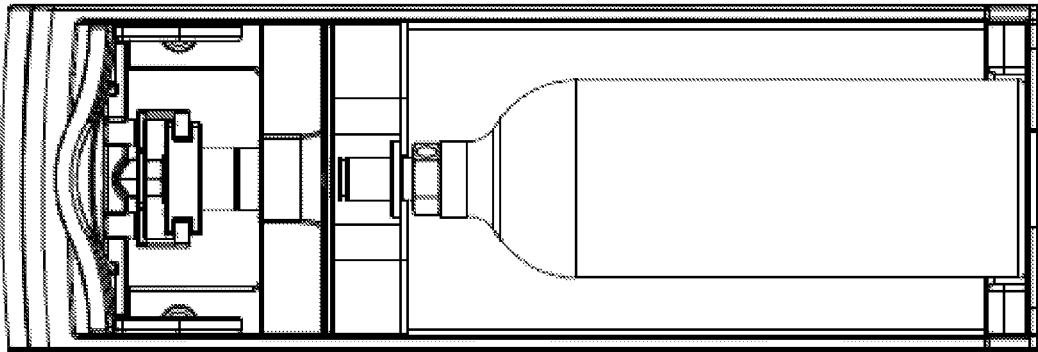


FIG. 6b

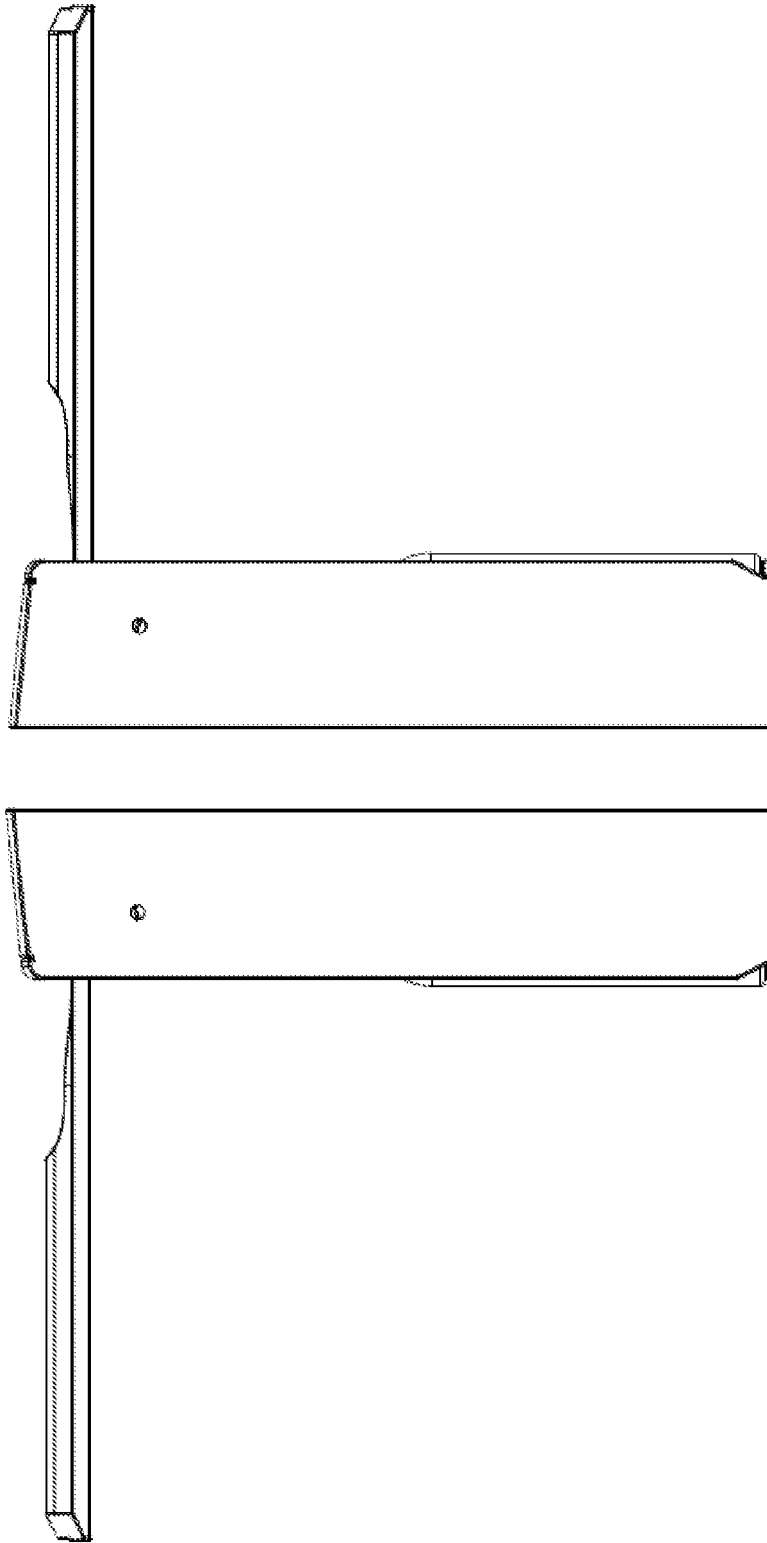


FIG. 7b

FIG. 7a



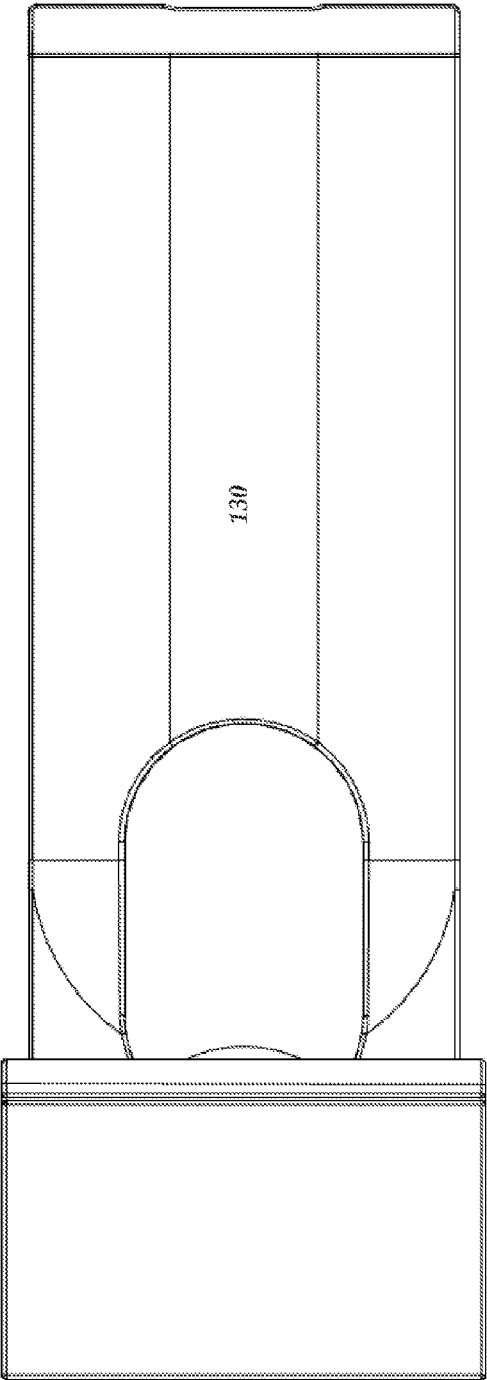


FIG. 8a

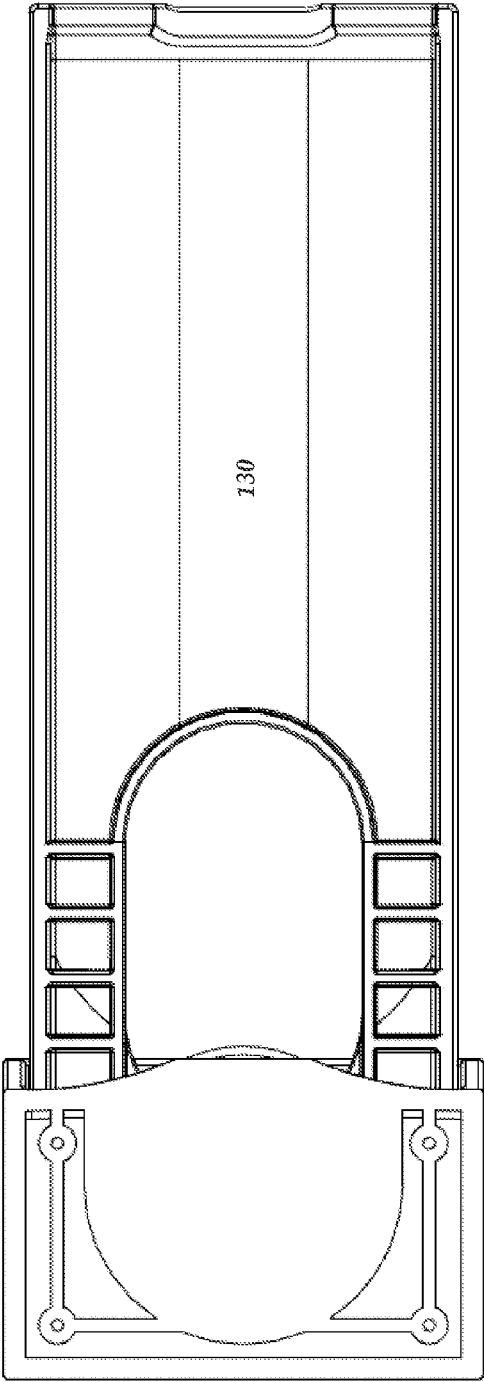


FIG. 8b

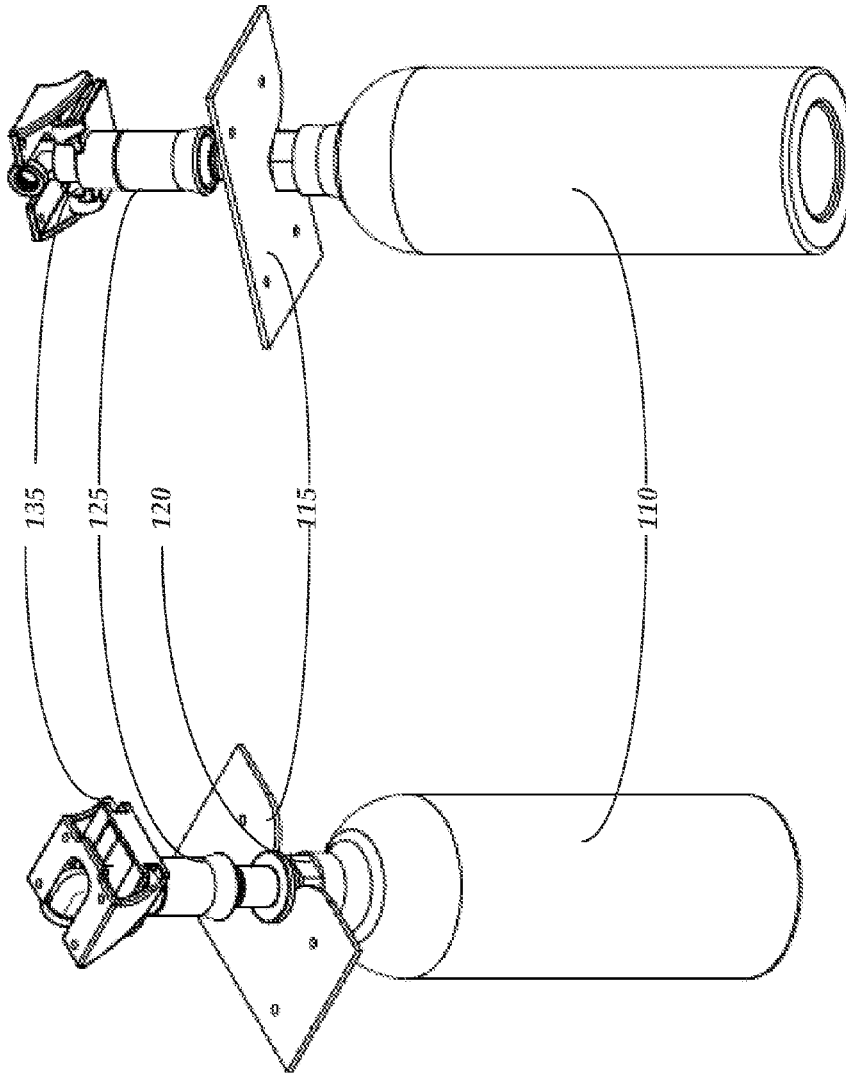


FIG. 9b

FIG. 9a

1

# EFFICIENTLY AND EASILY OPENING AND CLOSING A CANISTER VALVE

## CROSS REFERENCE TO RELATED APPLICATIONS

The present application is related to U.S. Provisional Patent Application Ser. No. 61/792,889, entitled "Efficiently and Easily Opening and Closing a Canister Valve" and filed on Mar. 15, 2013.

## BACKGROUND

CO<sub>2</sub> gas may leak from a CO<sub>2</sub> canister when connecting the canister to an external system. This leakage reduces the amount of useful CO<sub>2</sub>. The present disclosure addresses this issue and discloses a more convenient and simple connection mechanism.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate various embodiments of the present invention. In the drawings:

FIG. 1 illustrates one embodiment of a canister connection apparatus,

FIG. 2 illustrates a cross-sectional view of the canister connection apparatus,

FIG. 3 illustrates another cross-sectional view of the canister connection apparatus,

FIG. 4 illustrates a block diagram of a system including a canister connection apparatus,

FIGS. 5a-5b illustrate three dimensional views of the canister connection apparatus,

FIGS. 6a-6b illustrate a front view and a back view of the canister connection apparatus,

FIGS. 7a-7b illustrate side views of the canister connection apparatus,

FIGS. 8a-8b illustrate different views of a door of the canister connection apparatus, and

FIGS. 9a-9b illustrate three dimensional views of canister connection apparatus components.

## DETAILED DESCRIPTION

The following detailed description refers to the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the following description to refer to the same or similar elements. While embodiments of the invention may be described, modifications, adaptations, and other implementations are possible. For example, substitutions, additions, or modifications may be made to the elements illustrated in the drawings, and the methods described herein may be modified by substituting, reordering, or adding stages to the disclosed methods. Accordingly, the following detailed description does not limit the invention. Instead, the proper scope of the invention is defined by the appended claims.

Embodiments of the invention may provide a canister connection apparatus designed to efficiently and easily connect a pressurized canister to an external system. FIG. 1 illustrates one embodiment of a canister connection apparatus 100. Apparatus 100 may receive a pressurized canister 110 in a housing 105. Housing 105 may be used to connect canister 110 to an external system. Canister 110 may be, but is not limited to, for example, a CO<sub>2</sub> canister.

2

The external system may be, but is not limited to, for example, a beverage dispensing system. Though FIG. 1 shows apparatus 100 to include a canister 110, a canister need not be included as part of apparatus 100. Rather, apparatus 100 may comprise a nest 115 designed to interface with various types of canisters having various volumes. Moreover, the term 'apparatus', as used herein, may include any combination of components or apparatuses.

Canister connection apparatus 100 may be designed to connect canister 110 to the external system efficiently and easily while mitigating the risk of gas leakage. Apparatus 100 may achieve this solution by sealing and covering a canister fitment 120 with a receiver fitment 125. Consistent with embodiments of the invention, apparatus 100 may comprise a movement mechanism 125 that may cause receiver fitment 125 to slide over canister fitment 120 as door 130 is lowered. In other embodiments, apparatus 100 may comprise a mechanism that inserts canister 110, along with canister fitment 120, into receiver fitment 125.

Generally stated, the lowering of door 130 may serve at least two purposes. First, it may cause receiver fitment 125 to connect with canister fitment 120 and open a canister valve to enable gas flow. Second, it may serve to protect a handler of canister 110 from any leaks that may occur during the connection process by shielding the canister valve from the handler.

As receiver fitment 125 connects with canister fitment 120, a valve opening component of receiver fitment 125 may open the canister valve, thereby allowing gas to flow from canister 110 into apparatus 100 (i.e. charging the apparatus). The charged apparatus 100 may then be connected to (or, in various embodiments, may already be connected to) an external system via, for example, a port in housing 105 and feed the external system with the gas contained in canister 110.

FIG. 2 illustrates a cross-sectional view of canister connection apparatus 100. A user of canister connection apparatus 100 may first insert canister 110 into canister housing 105. Though housing 105 is not shown in FIG. 2, it is illustrated in FIG. 3. Canister housing 105 may be equipped with a canister nest 115 designed to secure canister 110 within canister housing 105. As mentioned above, nest 115 may be designed to receive and secure canisters of various types and sizes within canister housing 105. In various embodiments, the nest 115 may include a landing or other cutout designed to engage with a flange or other corresponding feature on the canister fitment 120 so as to secure the canister in the housing 105 and align the canister fitment 120 with the receiver fitment 125.

The user may then close door 130 of the apparatus 100 about an angle 205. As door 130 is closed, an over-center movement mechanism 135 causes receiver fitment 125 to slide about an axis 210 and cover canister fitment 120. For example, the over-center movement mechanism 135 may engage with a cam on the door 130. As the door 130 is moved, the over-center movement mechanism 135 may travel along the cam in such a way as to cause motion about axis 210. The axis 210 may be a vertical axis and/or may be parallel to an axis of a fluid flow pathway between the canister 110 and the receiver fitment 125. In various embodiments, a different sliding mechanism may be employed to cause canister 100 to be inserted into receiver fitment 125 as door 130 is closed. Additionally, receiver fitment 125 may be designed to clamp over canister fitment 120 once it is connected to canister fitment 120 so as to further secure canister 110. For example, a lower most portion of the receiver fitment 125 may be pushed onto the top surface of the flange on the canister fitment 120.

3

As receiver fitment **125** connects with canister fitment **120**, an o-ring of canister fitment **120** seals the connection. In various embodiments of the invention, a valve opening component of receiver fitment **125** may force open a valve of canister **110** upon its connection to canister fitment **120**. The opening of the valve may allow gas to flow from canister **110** to canister connection apparatus **100**. In various embodiments, the o-ring of the canister fitment **120** seals the connection prior to the valve opening component of the receiver fitment **125** opening the valve of canister **110**. In various embodiments, canister connection apparatus **100** may be designed so that the opening of canister valve occurs when door **130** has already been substantially closed.

The connection between receiver fitment **125** and canister fitment **120** effectively shield the user from accidental gas discharge in case of a defective o-ring or other anomaly. Moreover, since the canister valve may be opened only as door **130** is lowered, door **130** may also serve as shield protecting the user from accidental gas discharge.

As door **130** is opened about angle **205**, receiver fitment **125** may be disconnected from canister fitment **120** in a similar way that it was connected to canister fitment **120** (e.g., about axis **210**). In various other embodiments, canister fitment **120** may be disconnected from receiver fitment **125** in a similar way that it was connected to receiver fitment **125**. The disconnection between receiver fitment **125** and canister fitment **120** may shut the canister valve, thereby stopping the gas flow. In this way, the user may be shielded from the potential gas discharge from disconnecting canister **110** from apparatus **100** in a similar way in which the user was shielded when connecting canister **110**. In various embodiments, the o-ring of the canister fitment **120** seals the connection until after the valve opening component of the receiver fitment **125** disengages with the valve of canister **110** and allows the valve of the canister **110** to close.

Consistent with embodiments of the invention, canister connection apparatus **100** may comprise a locking mechanism. For example, door **130** may be latched to housing **105** when closed. The latch may comprise, but is not limited to, for example, an electrical solenoid. The opening of door **130** may be, for example, password protected. Any suitable locking mechanism may be used.

FIG. 4 illustrates a system comprising canister connection apparatus **100**. The system may comprise a beverage dispenser **400** and includes a user interface **402**, a push to pour button **404**, a carbonator **406**, and a nozzle **408**. Syrups may be stored in a plurality of syrup cartridges (e.g., a first syrup cartridge **410**, a second syrup cartridge **412**, a third syrup cartridge **414**, and a fourth syrup cartridge **416**). Flavors may be stored in a plurality of flavor cartridges (e.g., a first flavor cartridge **418**, a second flavor cartridge **420**, a third flavor cartridge **422**, a fourth flavor cartridge **424**). The plurality of syrup cartridges and the plurality of flavor cartridges are connected to the nozzle **408**.

During operation, a user may select a beverage using the user interface **402**. When the user presses the push to pour button **404**, carbonated water flows from the carbonator **406** to the nozzle **408** and the appropriate syrups and/or flavors flow from the plurality of syrup cartridges and/or the plurality of flavor cartridges. In a post mix beverage dispenser the, the syrups, flavors, and carbonated water mix about the nozzle **408**. For example, if a user selects a cherry flavored cola, carbonated water will flow from the carbonator **406** to the nozzle **408**. The cola syrup and cherry flavoring will flow from the appropriate cartridges to the nozzle **408**. The ingredients will then flow through the nozzle **408** and may air mix within the exiting fluid stream and a cup **426**.

4

The carbonated water is formed within the carbonator **406**. To form the carbonated water, CO<sub>2</sub> flows from a carbon dioxide source (e.g., canister connection apparatus **100**) to the carbonator **406**. Still water may flow into the carbonator **406** from an external source **430**. The cooperation of the beverage dispenser may be controlled by a control module **432**. The control module **432** may also monitor a backpressure, via a pressure sensor **434**, within the plumbing between the carbonator **406** and the nozzle **408**.

FIG. 5a is a first three dimensional view of canister connection apparatus **100**. FIG. 5b is a second three dimensional view of canister connection apparatus **100**. FIG. 6a is a front view of canister connection apparatus **100**. FIG. 6b is a back view of canister connection apparatus **100**. FIG. 7a is a first side view of canister connection apparatus **100**. FIG. 7b is a second side view of canister connection apparatus **100**. FIG. 8a is a front view door **130**. FIG. 8b is a back view door **130**. FIGS. 9a-9B are three dimensional view of canister **110**, nest **115**, canister fitment **120**, receiver fitment **125**, and movement mechanism **135**.

We claim:

1. An apparatus comprising:

a nest configured to receive a canister;  
a door configured to rotate about an angle so as to open and close;  
a receiver fitment configured to connect to a canister fitment; and  
an over-center movement mechanism connected to the door and the receiver fitment, wherein the over-center movement mechanism is configured to move the receiver fitment along an axis as the door is rotated about the angle.

2. The apparatus of claim 1, wherein the over-center movement mechanism is further configured to move the receiver fitment along the axis towards the nest as the door is closed.

3. The apparatus of claim 1, wherein the over-center movement mechanism is further configured to move the receiver fitment along the axis away from the nest as the door is opened.

4. The apparatus of claim 1, wherein the receiver fitment is configured to open a valve on the canister fitment.

5. The apparatus of claim 1, wherein the receiver fitment is configured to at least one of: cover the canister fitment and clamp the canister fitment.

6. The apparatus of claim 1, wherein the nest for receiving the canister is configured to securely position the canister within the apparatus such that the receiver fitment is aligned with the canister fitment.

7. The apparatus of claim 1, wherein the nest for receiving the canister is configured to secure canisters of different sizes within the apparatus.

8. The apparatus of claim 1, further comprising a port for connecting to an external system.

9. The apparatus of claim 8, wherein the port is in fluid communication with the receiver fitment.

10. The apparatus of claim 9, wherein the external system comprises a beverage dispensing system.

11. An apparatus comprising:

a canister comprising a canister fitment;  
a nest configured to receive the canister, wherein the canister is installed in the nest;  
a door configured to rotate about an angle so as to open and close;  
a receiver fitment configured to connect to the canister fitment; and  
an over-center movement mechanism connected to the door and the receiver fitment, wherein the over-center

**5**

movement mechanism is configured to move the receiver fitment along an axis as the door is rotated about the angle.

\* \* \* \* \*

**6**